

# Several Unusual Malesian Diplazia

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## Summary

The affinities of four small and deceptively similar species of *Diplazium* (Filices: Athyriaceae) are discussed. Five names are newly reduced to synonymy and two new combinations are made.

In *Genera Filicum*, Copeland (1947, p. 151) said he was tempted to describe a new genus for the Malesian diplazia with narrow dark fronds and abundant black paleae, of which he accepted six species. He reiterated his belief that they constitute a well-marked natural group in *Fern Flora of the Philippines* 3 (1961, p. 412). In 1973 (*British Fern Gazette* 10: 258) I added what I thought was an additional species and expressed the opinion that my new species provided a link with *Diplazium*, so that separating the group from that genus would be unjustified.

I have now examined types of what I believe are all relevant names and have seen many other specimens from K, L, MICH, NY, P, PNH, UC, and US, finding that only four species are involved, and that they belong in three different not very closely related lines within the genus *Diplazium*. However, they agree in the following characters: rhizome short-erect, with thick wiry black roots; fronds narrowly elliptic, pinnate or subpinnate, apex coadunate, segments numerous, usually dark; paleae abundant on stipe and rachis, narrow, usually dark and shiny; veins free. The four species may be distinguished as follows:

## Key to the species

1. Fronds pinnate except near apex; rachis blackish beneath paleae
  2. Pinnae lobed or incised; grooves of pinna-costae entering rachis groove; paleae strongly toothed ..... 1. *D. egenolfioides*
  2. Pinnae subentire; rachis channel uninterrupted; paleae entire ..... 2. *D. fuliginosum*
1. Fronds pinnatifid except sometimes at the very base; rachis brownish beneath paleae
  3. Paleae blackish, numerous on stipe, rachis, costae, and veins beneath, also present above where costae meet rachis; frond narrowing gradually towards base, drying dark greenish brown ..... 3. *D. lomariaceum*
  3. Paleae brown, present on stipe, rachis, and costae beneath; frond not or only moderately narrowed downwards, drying dull greyish brown ..... 4. *D. porphyrorachis*

1. *Diplazium egenolfioides* Price, Brit. Fern Gaz. 10 (1973) 258, t.1.

*Type:* Philippines, Luzon, Laguna, Mt Makiling, Price 1762, 29 Aug. 1971 (PNH; BM, GE, K, L, OSAK, SING, US).

Paleae black, shiny, strongly and regularly toothed, to  $8 \times 0.8$  mm, tapering evenly, abundant on stipe and rachis, few on costae beneath. Stipes to 10 cm long. Lamina to  $42 \times 15$  cm, narrowly elliptic, fully pinnate nearly throughout. Pinnae to  $8 \times 2$  cm, lanceolate, the lowest on stalks to 1 mm, sessile upwards and truncate at base, apex acute, margins cut up to  $\frac{3}{4}$  of the way to costa into segments to 6 mm broad. Colour very dark green. Rachis groove above open to and joining grooves of pinna-costae, the raised cartilaginous sides of grooves of pinna-costae joining the sides of the rachis groove, not paleate. Indusia pale brown, margin slightly undulate. Spores pale brown with a broad plane median wing.

*Distribution:* Luzon, the type locality (several collections) and Nueva Vizcaya, Sta. Fe, Mts. N. of Imugan, c. 1200 m. *L.L.Co 1460* (MICH, PNH, PUH).

*Notes:* The prevalent type of axis architecture in *Diplazium* is confluent raised cartilaginous ridges bordering the grooves of rachises and costae. Of the four species treated here, only *D. egenolfioides* has this axis character, which immediately links it to the bulk of the genus. Of species with which I am familiar, fairly close to *D. egenolfioides* are *D. banahaoense* (Copel.)C.Ch. and ***Diplazium symmetricum*** (Copel.)Price, *comb. nov.* (*basionym: Athyrium symmetricum* Copel. Philip. J. Sci. 81 (1952) 41. *Lectotype:* Philippines, Samar, Mt Cabayanan, Edaño PNH 15148, MICH).

2. ***Diplazium fuliginosum*** (Hook.)Price, Brit. Fern Gaz. 10 (1973) 260; *Asplenium fuliginosum* Hook. Sp. Fil. 3 (1859) 120; C.Ch. Gard. Bull. S.S. 7 (1934) 280; *Athyrium fuliginosum* (Hook.)Copel. Philip. J. Sci. 56 (1935) 476; *Asplenium lugubre* Hook. Second Cent. Ferns (1861) t.3 (non Liebm. 1849). *Type:* North Borneo, Mt Kinabalu, H. Low (K).

*Diplazium acrocarpum* Rosenst. Repert. Sp. Nov. Fedde 10 (1912) 328; *Asplenium acrocarpum* (Rosenst.)Hieron. Hedwigia 61 (1919) 32; Bot. Jahrb. 56 (1920) 148; *Athyrium acrocarpum* (Rosenst.)Copel. Philip. J. Sci. 78 (1951) 472; *Asplenium fuliginosum* forma *acrocarpum* (Rosenst.)C.Ch. Brittonia 2 (1937) 290. *Type:* North-east New Guinea, Sattelberg, Keysser 27, 1911 (B? *isotypes* NY, UC).

*Athyrium longissimum* Copel. Philip. J. Sci. 38 (1929) 139, *syn. nov.*; Fern Fl. Philip. 3 (1961) 411; *Diplazium longissimum* (Copel.) C.Ch. Ind. Fil. Suppl. 3 (1934) 74. *Type:* Philippines, Leyte, Dagami, Ramos BS 15269, Aug. 1912 (MICH).

Paleae blackish, shiny, brittle, entire, to  $6 \times 1$  mm, abundant on stipe, rachis, costae and veins beneath. Stipes to 16 cm long. Lamina very narrowly elliptic, to  $79 \times 13$  cm, fully pinnate in at least the lower  $\frac{2}{3}$ . Pinnae to  $8 \times 2$  cm, lanceolate, sessile and truncate at base, apex sharply acute, margins subentire, very thin and translucent. Colour very dark green, when living succulent with a bluish cast. Rachises above concave or channelled but without raised cartilaginous sides, insertion of pinnae not affecting channel, not paleate. Indusia blackish with a thin brown outer edge. Spores pale brown with broad crisped pale anastomosing wings.

*Distribution:* Bismarck Arch. (New Ireland), New Guinea (widespread), North Borneo (Mt Kinabalu, common), Philippines (Leyte, one collection), occurring in shaded moist ravines in montane forests, c. 1000-3000 m.

*Notes:* *Diplazium acrocarpum* has sori confined to the pinna-apices but this character is inconstant and unreliable, as both fully fertile and only apically fertile pinnae may occur on a single frond, for example as in *Holtum SFN 25529* from Mt Kinabalu (US). *Athyrium longissimum* has narrow fronds (c. 5 cm broad) but agrees in all essential characters. *Hoogland 9323* (NY) is aberrant in having shallowly lobed pinnae.

*D. fuliginosum* is one of the most unusual of all diplazia, and was not transferred to that genus until recently. It is strikingly peculiar by the smooth rachis channel without raised sides, uninterrupted by the insertion of pinna-costae. In small fronds, and distally on large fronds, the rachis is almost flat above. Other of its features unusual to *Diplazium* are sori uniformly extending from costa to margin, and thin translucent pinna-margins.

Rather than to the other three species treated here, I believe that the closest relationship of *D. fuliginosum* is to *D. cumingii* (Presl)C.Chr., with which it agrees in dark frond colour and black axes aging to greyish; axes without cartilaginous ridges; paleae on stipe abundant, dark, entire; and indusia black with very narrow pale brown margin, curling back at maturity; even though *D. cumingii* is very different in its conform frond apex and broadly elliptic pinnae. However, it should be noted that almost exactly the same frond form (and even margin structure) as *D. fuliginosum* was independently evolved in the Central American *D. harrisonii* (Bak.)C.Chr., which otherwise differs markedly in paleae and the architecture of the axes.

3. ***Diplazium lomariaceum*** (Christ)Price, **comb. nov.**; *Asplenium lomariaceum* Christ, Verh. Naturf. Ges. Basel 11 (1895) 229. *Type:* Central Celebes, Takalekadjo, F. & P. Sarasin 994, 8 Feb. 1895 (P, *lectotype*).

*Diplazium merrillii* Copel. Philip. J. Sci. 2C (1907) 128, t.2A, **syn. nov.**; Hieron. Bot. Jahrb. 56 (1920) 134; *Athyrium merrillii* (Copel.)Copel. Philip. J. Sci. 3C (1908) 300; 56 (1935) 476; Fern Fl. Philip. 3 (1961) 411. *Type:* Philippines, Mindoro, Mt Halcon, *Merrill 5914*, Nov. 1906 (*Lectotype* MICH; US).

*Diplazium porphyrolepium* v.A.v.R. Bull. Jard. Bot. Buitenz. II, 20 (1915) 11, **syn. nov.** *Type:* Celebes, Soemalilah, Capt. van Vuuren's Explor. Comm., *Rachmat 481* (BO?; L).

*Diplazium porphyrophyllum* v.A.v.R. Bull. Jard. Bot. Buitenz. II, 28 (1918) 18, **syn. nov.** *Lectotype:* Ceram, Wai Lantabi, L. Rutten's Explor. Comm., *Kornassi 1240*, 4 May 1918 (L).

*Athyrium altum* Copel. Philip. J. Sci. 38 (1929) 138, **syn. nov.**; Fern Fl. Philip. 3 (1961) 411; *Diplazium altum* (Copel.) C.Chr. Ind. Fil. Suppl. 3 (1934) 72. *Type:* Philippines, Mindanao, Agusan, Mt Urdaneta, *Elmer 14081*, Oct. 1912 (MICH; L, NY, US).

Paleae blackish, shiny, entire, to  $9 \times 1$  mm, gradually narrowed to a hair-tip, abundant and persistent on stipe, rachis, costae, and veins beneath. Stipes of fertile fronds to 15 cm long, of sterile to 9 cm. Lamina narrowly elliptic, to  $50 \times 9.5$  cm, deeply pinnatifid, one pair of reduced basal pinnae sometimes free and sessile. Lobes to  $4.5 \times 1$  cm, oblong-lanceolate, narrowing towards apex, subentire, blunt. Colour dark greenish-brown,  $\pm$  shiny below when dry, dark bluish-green when living. Rachises above with a channel formed by raised cartilaginous sides, either continuous or interrupted at each junction with a mid-vein of a lobe, and paleate at that point whether or not interrupted. Indusia brown, margin erose. Spores brown, with irregular short wings.

*Distribution:* Philippines, including Luzon (Ilocos Norte – Price 2932, Rizal, Quezon), Mindoro, Leyte, Negros, Mindanao, Basilan; Borneo, including Sabah, Sarawak, and Kalimantan; Celebes, Ceram, New Guinea (collected only in North-east), in moist montane forest, 400-2000 m.

*Notes:* *Diplazium merrillii* was a small plant only partially fertile. The holotype was destroyed in 1945 at the PNH so I here designate the MICH specimen as lectotype. *D. porphyrolepium* and *D. porphyrophyllum* are not exceptional in any way. The latter had a syntype purportedly from Sumatra, Brooks 322S which I have not seen and from where this species is otherwise unknown. I designate the specimen from Ceram at L as lectotype. *Athyrium altum* is a form with narrow fronds not otherwise distinguishable. Three specimens from eastern Kalimantan (Kostermans 9089, Meijer 577, 872 – all L) differ by having fewer and brownish paleae but agree in distribution of paleae, and in frond form and colour. *Diplazium lomariaceum* is very closely related to *D. porphyrorachis* and until now the name seems to have been ignored since Christ himself reduced *lomariaceum* to *porphyrorachis* in Ann. Jard. Bot. Buitenz. 15 (1898, p. 119).

4. ***Diplazium porphyrorachis*** (Bak.)Diels, Nat. Pflanzenf. I, 4 (1899) 225; *Asplenium porphyrorachis* Bak. J. Bot. 17 (1879) 40; Icon. Pl. 17 (1886) t.1650; C.Chr. Gard. Bull. S.S. 7 (1934) 279, p.p.; *Athyrium porphyrorachis* (Bak.) Copel. Philip. J. Sci. 3C (1908) 300; *Polypodium subserratum* Hook. Sp. Fil. 4 (1863) 202 (non *Diplazium subserratum* (Bl.) Moore, 1861). *Type:* Borneo, prob. W. Sarawak, A. R. Wallace s.n. 1855 (K).

Paleae dull brown, entire, to  $5 \times 0.5$  mm, rapidly narrowed to a hair-tip, present on stipe, rachis and costae beneath but relatively inconspicuous. Stipes of fertile fronds to 37 cm, of sterile to 13 cm long. Lamina lanceolate, to  $35 \times 9$  cm, deeply pinnatifid with up to two free pairs of sessile opposite basal pinnae. Lobes to  $5.5 \times 1$  cm, narrowly oblong with mostly parallel sides, apex usually rounded and denticulate, bluntly acute in the largest fronds. Colour dull greyish-brown when dry, dark green when living. Rachises above with a channel formed by raised cartilaginous sides, continuous or interrupted at each junction with the midvein of a lobe, not paleate. Indusia brown, margin erose. Spores pale brown with short irregular translucent wings.

*Distribution:* Borneo, including Sarawak (where often common), Brunei,

Sabah, and Kalimantan, terrestrial on embankments and petrophytic, in forest shade, 300-1000 m.

*Notes:* Christensen gave the unpublished varietal name *murudense* to a large specimen narrowed towards the base with long-pointed lobes (Sarawak, Mt Murud, *Sar. Mus. Nat. Coll.* 2937, PNH). Similar specimens have been found on the nearby Gunong Mulu (*M. Hotta* 15188, L) and at Matang (*Sinclair & Kadim* 10346, K).

The two species *D. porphyrorachis* and *D. lomariaceum* are very closely related and some specimens show signs of apparent gene interchange. They were combined by Christensen (1934) but seem to be amply distinct by the characters utilized in the key. I believe that the closest relationship of these two with other species is not at all with the other two treated in this paper, but, of the diplazia I know, with *D. sorzogonense* (Presl) Presl. *D. sorzogonense* has similarities to especially *D. porphyrorachis* in paleae, indusia, spores, frond colour and texture, and the structure of the pinna axes of the former is similar to the rachis structure of the latter.